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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/004,784	12/07/2001	Cha Deok Dong	054216-5006	7960

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EXAMINER	
FOONG, SUK SAN	
ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 11/07/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/004,784	DONG ET AL.	
	Examiner	Art Unit	
	Suk-San Foong	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-9 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-9 is/are rejected.

7)☒ Claim(s) 2 and 6 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Objections

1. Claims 2 and 6 are objected to because of the following informalities: the term "DCS" should be replaced by the full term. Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-9 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. There is insufficient guidance to one ordinary skilled in the art to perform the method of claim 1, lines 10-11. It appears that nitrogen-containing film would be oxidized on both the upper and lower surface and the substrate surface would be oxidized to form oxide films above and below the nitrogen-containing layer in view of the disclosure of Hori, Section III (IEEE Transactions on Electron Devices).

4. In claim 4 line 2 and claim 5 line 2, it is questioned what is recited through "one of N_2O and NO of 1-20 into a furnace" and "oxygen gas of 5-20 into a furnace". It appears that the units are missing

5. In claim 9, line 2, it is questioned whether the ratio recited is the ratio of thickness between the polysilicon film and the undoped polysilicon film.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 1-9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 1, line 8, it appears that "nitrogen layer" should be replaced by--nitrogen-containing layer--in all occurrences including the specification.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1, 2 and 4-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. ('052) in combination with Liu ('474) and Wolf.

Chang et al. ('052) teaches a method of forming a flash memory semiconductor device which includes forming tunnel oxide film 31 on semiconductor substrate 15 (Col. 6, lines 45-47, and Figs. 1 and 5), then forming first polysilicon film 32 (Col. 6, lines 51-52, and Fig. 6), subsequently etching first polysilicon film 32 and a portion of tunnel oxide film 31 (Col. 6, lines 54-57, and Fig. 6), then depositing oxide-nitride-oxide (ONO) dielectric layer 62 over substrate 15 by first forming lower oxide film 64, then forming nitride layer 64 and finally forming upper oxide film 68 using dichlorosilane gas (SiH_2Cl_2 or DCS) and N_2O gas at a temperature of 800-1000°C (Col. 6, line 66 to Col. 7, line 14, and Col. 5, lines 34-39, and Fig. 7), subsequently forming second polysilicon film 70 over dielectric film 62 (Col. 7, lines 15-17, and Fig. 8), then forming tungsten silicide film 72 over second polysilicon film 70 (Col. 7, lines 17-19), subsequently forming photoresist layer 74 over substrate 15 (Col. 7, lines 19-20), and then patterning tungsten silicide film 72, second polysilicon film 70 and dielectric film 62 to form control gate and first polysilicon film 32 and tunnel oxide 31 to form floating gate (Col.7, lines 20-21, and Fig. 8).

Chang et al. does not teach the steps as recited in claim 1, lines 5-11.

Liu teaches a method of forming a gate dielectric film for semiconductor devices which includes forming gate oxide film 11 over substrate 10 (Col. 1, lines 38-39, and Fig. 1A), then performing a nitrification process by introducing either N_2O or NO into a furnace at a temperature of about 750-850°C thereby forming an nitrogen-containing layer 12 (Col. 1, lines 40-45), then performing an annealing process by introducing oxygen gas at a temperature of about 750-850°C (Col. 1, lines 46-50).

It would have been within the scope to one ordinary skill in the art to combine both teachings because it would enable formation of lower oxide film 64 and nitride layer 64 of Chang et al. to be performed.

In regard to the formation of the nitrogen-containing layer and nitride layer, these two layers would be obtained as the same materials are being treated the same as the instant invention.

The choice of thickness of the nitrogen-containing layer would have been a matter of routine optimization to achieve the desired device and the desired device characteristics of the device to be formed. (See MPEP 2144.05)

The combination process does not teach forming an anti-reflective film over semiconductor substrate.

Wolf teaches depositing anti-reflection film over polysilicon layer prior to depositing photoresist layer (p. 441).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Wolf with the combination because it would enable formation of control gate and floating gate of Chang et al. to be performed and obtain further advantage of reducing standing wave effects.

11. Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. ('052) in combination with Liu ('474) and Wolf as applied to claims 1, 2 and 4-6 above.

The combination does not disclose the thickness and the deposition rate of lower oxide film and upper oxide film.

The choice of thickness and deposition rate of lower oxide film and upper oxide film would have been a matter of routine optimization to achieve the desired device and the desired device characteristics of the device to be formed. (See MPEP 2144.05)

12. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. ('052) in combination with Liu ('474) and Wolf as applied to claims 1, 2 and 4-6 above, and further in view of Byun et al. (630).

The combination process does not disclose the step as recited in claim 8.

Byun et al. discloses a method for fabricating a semiconductor device which includes forming first oxide film 21 on semiconductor substrate 20, then forming doped polysilicon layer 22 to a thickness of 800Å (Col. 3, lines 60-62, and Col. 4, lines 9-10), then forming undoped polysilicon layer 23 to a thickness 200Å, and subsequently forming tungsten silicide layer 24 over undoped polysilicon layer 23 (Col. 4, lines 1-3).

It would have been within the scope to one ordinary skill in the art to combine the teachings of Byun et al. and the combination process because it would enable formation of control gate of the combination to be performed and obtain further advantage of improving resistivity (Col. 2, lines 49-51).

The choice of thickness ratio of doped polysilicon with undoped polysilicon would have been a matter of routine optimization to achieve the desired device and the desired device characteristics of the device to be formed. (See MPEP 2144.05)

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Suk-San Foong whose telephone number is 703-305-0383. The examiner can normally be reached on Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431, 3432).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

SF
November 3, 2002

George Fourson
Primary Examiner
Art Unit 2823